checked by RI
09/25/15

**MEMORANDUM**

**TO:** Mr. Terry Taylor
Anderson, Mulholland and Associates

**DATE:** September 16, 2015

**FROM:** R. Infante

**FILE:** JC2870

**RE:** Data Validation
**Air samples**
**BMSMC, Building 5 Area, PR**
**SM04.00.06**
**Building 8 Vapor Intrusions**

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## SUMMARY

Full validation was performed on the data for several gas samples analyzed for selected volatile organic compounds by method Compendium Method TO-15: Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS), January, 1999 and by method TO-3: METHOD FOR THE DETERMINATION OF VOLATILE ORGANIC COMPOUNDS IN AMBIENT AIR USING CRYOGENIC PRECONCENTRATION TECHNIQUES AND GAS CHROMATOGRAPHY WITH FLAME IONIZATION AND ELECTRON CAPTURE DETECTION, April, 1984. The samples were collected at the Bristol Myer Squib-Building 5 area, Humacao, PR site on August 31, 2015 and submitted to Accutest Laboratories, of Dayton, New Jersey that analyzed and reported the results under delivery groups (SDG) JC2870.

The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: Compendium Method TO-15. Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS), January, 1999; Validating Air Samples. Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15, (SOP # HW-31. Revision #4. October, 2006. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted. In general the data is valid as reported and may be used for decision making purposes.

The data results are acceptable for use.

## SAMPLES

The samples included in the review are listed below

| Client Sample ID | Lab. Sample ID | Collected Date | Matrix | Analysis |
|---|---|---|---|---|
| B8-SSV2/08312015 | JC2870-1 | 08/31/2015 | Air | TO-3 |
| B8-SSV2/08312015 | JC2870-1A | 08/31/2015 | Air | TO-15 |
| B8-SSV1/08312015 | JC2870-2 | 08/31/2015 | Air | TO-15; TO-3 |
| B8-SSV1D/08312015 | JC2870-3 | 08/31/2015 | Air | TO-15; TO-3 |

## REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method

- Agreement of analysis conducted with chain of custody (COC) form
- Holding time and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tunes
- Initial and continuing calibrations
- Method blanks/trip blanks/field blank
- Canister cleaning certification criteria
- Surrogate spike recovery
- Internal standard performance and retention times
- Field duplicate results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Quantitation limits and sample results

## DISCUSSION

### Agreement of Analysis Conducted with COC Request

Sample reports corresponded to the analytical request designated on the chain-of-custody form.

### Holding Times and Sample Preservation

Sample preservation was acceptable.

Samples analyzed within method recommended holding time.

### GC/MS Tunes

The frequency and abundance of bromofluorobenzene (BFB) tunes were within the QC acceptance criteria. All samples were analyzed within the tuning criteria associated with the method.

### Initial and Continuing Calibrations

VOCs (Method TO-15)
The percent relative standard deviations (%RSDs) and response factors (RFs) of all target analytes were within the QC acceptance criteria in the initial calibration. Correlation coefficients ($r^2$) of target analytes were within the QC acceptance criteria. Ongoing accuracy of the instrument was determined by the analysis of a continuing calibration standard. All target analytes meet the method calibration/continued.

### Method Blank/Trip Blank/Field Blank

Target analytes were not detected in laboratory method blanks.

Summa canister met cleaning certification criteria.

No trip/field blank analyzed with this data package.

## Surrogate Spike Recovery

The surrogate recoveries were within the laboratory QC acceptance limits in all samples analyzed except for the followings:

TO-3:

- JC2870-1:- 4-BFB outside laboratory control limits (137 % recovery); control limits 61 - 137 %.
- JC2870-1D:- 4-BFB outside laboratory control limits (137 % recovery); control limits 61 - 137 %.

No action taken; % recoveries within control limits in second column. % recoveries within generally acceptable control limits.

TO-15:

- JC2870-2:- 4-BFB outside laboratory control limits (39 % recovery); control limits 65 - 128 %.
- JC2870-2:- 4-BFB outside laboratory control limits (36 % recovery); control limits 65 - 128 %
- JC2870-3:- 4-BFB outside laboratory control limits (55 % recovery); control limits 65 - 128 %.
- JC2870-1A:- 4-BFB outside laboratory control limits (22 % recovery); control limits 65 - 128 %.
- JC2870-1A:- 4-BFB outside laboratory control limits (23 % recovery); control limits 65 - 128 %.

No action taken, professional judgment.

## Internal Standard Performance

VOCs (TO-15)
Samples were spiked with the method specified internal standard. Internal standard are performance and retention times met the QC acceptance criteria in all sample analyses and calibration standards except for the followings:

| DATE | SAMPLE ID | IS OUT | IS AREA | ACCEPTABLE RANGE | ACTION |
|---|---|---|---|---|---|
| 09/03/15 | JC2870-1A | 5-Chlorobenzene-d5 | 870406 | 150209 - 350489 | No action |
| 09/03/15 | JC2870-2 | 5-Chlorobenzene-d5 | 588889 | 150209 - 350489 | No action |

No action taken, professional judgment.

## Laboratory/Field Duplicate Results

TO-3

Laboratory duplicates (JC2870-1/-1 DUP and JC3132-1/-1 DUP)) were analyzed as part of this data set. Target analytes meet the RPD performance criteria and generally acceptable laboratory control limits for analytes 5 x SQL. Field duplicates were samples B8-SSV108312015/B8-SSV1D/08312015,

target analytes meet the RPD performance criteria and generally acceptable control limits for analytes 5 x SQL.

TO-15

Laboratory duplicates (JC2480-6/-6 Duplicate and JC1343-1/-1 Duplicate)) were analyzed as part of this data set. Target analytes meet the RPD performance criteria and generally acceptable laboratory control limits for analytes 5 x SQL. Field duplicates were samples B8-SSV108312015/B8-SSV1D/08312015, target analytes meet the RPD performance criteria and generally acceptable control limits for analytes 5 x SQL.

## LCS/LCSD Results

VOCs
LCS/LCSD (blank spike) associated with this data package were analyzed by the laboratory. Recoveries and RPD within laboratory control limits.

## Quantitation Limits and Sample Results

TO-3:

Dilution was performed on sample JC2870-1 due to the presence of high level target species. All other samples diluted by a factor of less than 3.

Detected results for Methane in sample JC2870-1 exceed the instrument calibration range and are considered estimated values.

To-15

All samples diluted by a factor of less than 3.

Calculations were spot checked.

## Certification

The following samples JC2870-1; JC2870-1A; JC2870-2; and JC2870-3 were analyzed following standard procedures accepted by regulatory agencies. The quality control requirements met the methods criteria except in the occasions described in this document. The results are valid. Some of the results were qualified.

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# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV2/08312015 | | |
| **Lab Sample ID:** | JC2870-1 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A1216 | **Date Received:** | 09/02/15 |
| **Method:** | EPA TO-3 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | QT19182.D | 2.96 | 09/03/15 | TCH | n/a | n/a | GQT1156 |
| Run #2 | | | | | | | |

| | Initial Volume |
|---|---|
| Run #1 | 0.50 ml |
| Run #2 | |

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 74-82-8 | 16 | Methane | 385000 | 15 | 0.99 | ppmv | E | 252000 | 9.8 | 0.65 | mg/m3 |
| 74-98-6 | 44 | Propane | ND | 1.5 | 0.12 | ppmv | | ND | 2.7 | 0.22 | mg/m3 |
| 106-97-8 | 58 | n-Butane | ND | 1.5 | 0.18 | ppmv | | ND | 3.6 | 0.43 | mg/m3 |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 460-00-4 | 4-Bromofluorobenzene | 137% [a] | | 61-137% |
| 460-00-4 | 4-Bromofluorobenzene | 111% | | 61-137% |

(a) Outside control limits due to matrix interference, confirmed by sample duplicate.

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ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV2/08312015 | | |
| **Lab Sample ID:** | JC2870-1A | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A1216,A681 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | 3W49835.D | 59.2 | 09/02/15 | YMH | n/a | n/a | V3W1889 |
| Run #2 [a] | 3W49845.D | 59.2 | 09/03/15 | YMH | n/a | n/a | V3W1890 |

| | Initial Volume |
|---|---|
| Run #1 | 200 ml |
| Run #2 | 200 ml |

**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 67-64-1 | 58.08 | Acetone | 91.3 | 24 | 3.8 | ppbv | | 217 | 57 | 9.0 | ug/m3 |
| 106-99-0 | 54.09 | 1,3-Butadiene | ND | 24 | 3.7 | ppbv | | ND | 53 | 8.2 | ug/m3 |
| 71-43-2 | 78.11 | Benzene | ND | 24 | 3.5 | ppbv | | ND | 77 | 11 | ug/m3 |
| 75-27-4 | 163.8 | Bromodichloromethane | ND | 24 | 3.8 | ppbv | | ND | 160 | 25 | ug/m3 |
| 75-25-2 | 252.8 | Bromoform | ND | 24 | 2.4 | ppbv | | ND | 250 | 25 | ug/m3 |
| 74-83-9 | 94.94 | Bromomethane | ND | 24 | 2.6 | ppbv | | ND | 93 | 10 | ug/m3 |
| 593-60-2 | 106.9 | Bromoethene | ND | 24 | 2.4 | ppbv | | ND | 100 | 10 | ug/m3 |
| 100-44-7 | 126 | Benzyl Chloride | ND | 24 | 3.1 | ppbv | | ND | 120 | 16 | ug/m3 |
| 75-15-0 | 76.14 | Carbon disulfide | ND | 24 | 3.4 | ppbv | | ND | 75 | 11 | ug/m3 |
| 108-90-7 | 112.6 | Chlorobenzene | ND | 24 | 3.8 | ppbv | | ND | 110 | 18 | ug/m3 |
| 75-00-3 | 64.52 | Chloroethane | ND | 24 | 2.5 | ppbv | | ND | 63 | 6.6 | ug/m3 |
| 67-66-3 | 119.4 | Chloroform | ND | 24 | 3.7 | ppbv | | ND | 120 | 18 | ug/m3 |
| 74-87-3 | 50.49 | Chloromethane | ND | 24 | 3.4 | ppbv | | ND | 50 | 7.0 | ug/m3 |
| 107-05-1 | 76.53 | 3-Chloropropene | ND | 24 | 3.3 | ppbv | | ND | 75 | 10 | ug/m3 |
| 95-49-8 | 126.6 | 2-Chlorotoluene | ND | 24 | 3.9 | ppbv | | ND | 120 | 20 | ug/m3 |
| 56-23-5 | 153.8 | Carbon tetrachloride | ND | 24 | 2.9 | ppbv | | ND | 150 | 18 | ug/m3 |
| 110-82-7 | 84.16 | Cyclohexane | 1530 | 24 | 3.8 | ppbv | | 5270 | 83 | 13 | ug/m3 |
| 75-34-3 | 98.96 | 1,1-Dichloroethane | ND | 24 | 3.7 | ppbv | | ND | 97 | 15 | ug/m3 |
| 75-35-4 | 96.94 | 1,1-Dichloroethylene | ND | 24 | 3.4 | ppbv | | ND | 95 | 13 | ug/m3 |
| 106-93-4 | 187.9 | 1,2-Dibromoethane | ND | 24 | 4.2 | ppbv | | ND | 180 | 32 | ug/m3 |
| 107-06-2 | 98.96 | 1,2-Dichloroethane | ND | 24 | 3.1 | ppbv | | ND | 97 | 13 | ug/m3 |
| 78-87-5 | 113 | 1,2-Dichloropropane | ND | 24 | 6.0 | ppbv | | ND | 110 | 28 | ug/m3 |
| 123-91-1 | 88.12 | 1,4-Dioxane | ND | 24 | 7.5 | ppbv | | ND | 86 | 27 | ug/m3 |
| 75-71-8 | 120.9 | Dichlorodifluoromethane | ND | 24 | 4.3 | ppbv | | ND | 120 | 21 | ug/m3 |
| 124-48-1 | 208.3 | Dibromochloromethane | ND | 24 | 4.9 | ppbv | | ND | 200 | 42 | ug/m3 |
| 156-60-5 | 96.94 | trans-1,2-Dichloroethylene | ND | 24 | 2.4 | ppbv | | ND | 95 | 9.5 | ug/m3 |
| 156-59-2 | 96.94 | cis-1,2-Dichloroethylene | ND | 24 | 2.9 | ppbv | | ND | 95 | 11 | ug/m3 |
| 10061-01-5 | 111 | cis-1,3-Dichloropropene | ND | 24 | 4.2 | ppbv | | ND | 110 | 19 | ug/m3 |
| 541-73-1 | 147 | m-Dichlorobenzene | ND | 24 | 3.3 | ppbv | | ND | 140 | 20 | ug/m3 |
| 95-50-1 | 147 | o-Dichlorobenzene | ND | 24 | 3.6 | ppbv | | ND | 140 | 22 | ug/m3 |
| 106-46-7 | 147 | p-Dichlorobenzene | ND | 24 | 2.3 | ppbv | | ND | 140 | 14 | ug/m3 |
| 10061-02-6 | 111 | trans-1,3-Dichloropropene | ND | 24 | 2.4 | ppbv | | ND | 110 | 11 | ug/m3 |

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV2/08312015 | | |
| **Lab Sample ID:** | JC2870-1A | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A1216,A681 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

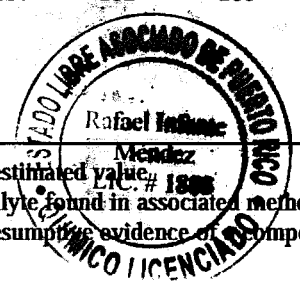
**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 64-17-5 | 46.07 | Ethanol | ND | 59 | 20 | ppbv | | ND | 110 | 38 | ug/m3 |
| 100-41-4 | 106.2 | Ethylbenzene | ND | 24 | 5.7 | ppbv | | ND | 100 | 25 | ug/m3 |
| 141-78-6 | 88 | Ethyl Acetate | ND | 24 | 7.5 | ppbv | | ND | 86 | 27 | ug/m3 |
| 622-96-8 | 120.2 | 4-Ethyltoluene | ND | 24 | 2.6 | ppbv | | ND | 120 | 13 | ug/m3 |
| 76-13-1 | 187.4 | Freon 113 | ND | 24 | 3.2 | ppbv | | ND | 180 | 25 | ug/m3 |
| 76-14-2 | 170.9 | Freon 114 | ND | 24 | 3.0 | ppbv | | ND | 170 | 21 | ug/m3 |
| 142-82-5 | 100.2 | Heptane | 1920 | 24 | 3.5 | ppbv | | 7870 | 98 | 14 | ug/m3 |
| 87-68-3 | 260.8 | Hexachlorobutadiene | ND | 24 | 3.9 | ppbv | | ND | 260 | 42 | ug/m3 |
| 110-54-3 | 86.17 | Hexane | 817 | 24 | 3.3 | ppbv | | 2880 | 85 | 12 | ug/m3 |
| 591-78-6 | 100 | 2-Hexanone | ND | 24 | 5.2 | ppbv | | ND | 98 | 21 | ug/m3 |
| 67-63-0 | 60.1 | Isopropyl Alcohol | ND | 24 | 14 | ppbv | | ND | 59 | 34 | ug/m3 |
| 75-09-2 | 84.94 | Methylene chloride | ND | 24 | 16 | ppbv | | ND | 83 | 56 | ug/m3 |
| 78-93-3 | 72.11 | Methyl ethyl ketone | ND | 24 | 5.8 | ppbv | | ND | 71 | 17 | ug/m3 |
| 108-10-1 | 100.2 | Methyl Isobutyl Ketone | ND | 24 | 3.2 | ppbv | | ND | 98 | 13 | ug/m3 |
| 1634-04-4 | 88.15 | Methyl Tert Butyl Ether | 531 | 24 | 3.1 | ppbv | | 1910 | 87 | 11 | ug/m3 |
| 80-62-6 | 100.12 | Methylmethacrylate | ND | 24 | 3.6 | ppbv | | ND | 98 | 15 | ug/m3 |
| 115-07-1 | 42 | Propylene | 250 | 59 | 9.6 | ppbv | | 429 | 100 | 16 | ug/m3 |
| 100-42-5 | 104.1 | Styrene | ND | 24 | 3.0 | ppbv | | ND | 100 | 13 | ug/m3 |
| 71-55-6 | 133.4 | 1,1,1-Trichloroethane | ND | 24 | 3.7 | ppbv | | ND | 130 | 20 | ug/m3 |
| 79-34-5 | 167.9 | 1,1,2,2-Tetrachloroethane | ND | 24 | 3.6 | ppbv | | ND | 160 | 25 | ug/m3 |
| 79-00-5 | 133.4 | 1,1,2-Trichloroethane | ND | 24 | 4.2 | ppbv | | ND | 130 | 23 | ug/m3 |
| 120-82-1 | 181.5 | 1,2,4-Trichlorobenzene | ND | 24 | 5.2 | ppbv | | ND | 180 | 39 | ug/m3 |
| 95-63-6 | 120.2 | 1,2,4-Trimethylbenzene | ND | 24 | 2.7 | ppbv | | ND | 120 | 13 | ug/m3 |
| 108-67-8 | 120.2 | 1,3,5-Trimethylbenzene | ND | 24 | 3.6 | ppbv | | ND | 120 | 18 | ug/m3 |
| 540-84-1 | 114.2 | 2,2,4-Trimethylpentane | ND | 24 | 2.5 | ppbv | | ND | 110 | 12 | ug/m3 |
| 75-65-0 | 74.12 | Tertiary Butyl Alcohol | 21.1 | 24 | 5.9 | ppbv | J | 64.0 | 73 | 18 | ug/m3 |
| 127-18-4 | 165.8 | Tetrachloroethylene | ND | 4.7 | 2.8 | ppbv | | ND | 32 | 19 | ug/m3 |
| 109-99-9 | 72.11 | Tetrahydrofuran | ND | 24 | 5.1 | ppbv | | ND | 71 | 15 | ug/m3 |
| 108-88-3 | 92.14 | Toluene | 12.3 | 24 | 2.4 | ppbv | J | 46.4 | 90 | 9.0 | ug/m3 |
| 79-01-6 | 131.4 | Trichloroethylene | ND | 4.7 | 3.0 | ppbv | | ND | 25 | 16 | ug/m3 |
| 75-69-4 | 137.4 | Trichlorofluoromethane | ND | 24 | 2.4 | ppbv | | ND | 130 | 13 | ug/m3 |
| 75-01-4 | 62.5 | Vinyl chloride | 42.4 | 24 | 3.8 | ppbv | | 108 | 61 | 9.7 | ug/m3 |
| 108-05-4 | 86 | Vinyl Acetate | ND | 24 | 6.5 | ppbv | | ND | 84 | 23 | ug/m3 |
| | 106.2 | m,p-Xylene | 30.4 | 24 | 5.1 | ppbv | | 132 | 100 | 22 | ug/m3 |
| 95-47-6 | 106.2 | o-Xylene | ND | 24 | 3.0 | ppbv | | ND | 100 | 13 | ug/m3 |
| 1330-20-7 | 106.2 | Xylenes (total) | 30.4 | 24 | 3.0 | ppbv | | 132 | 100 | 13 | ug/m3 |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 460-00-4 | 4-Bromofluorobenzene | 23% [b] | 22% [b] | 65-128% |

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound



# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV2/08312015 | | |
| **Lab Sample ID:** | JC2870-1A | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A1216,A681 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|

(a) Confirmation run.
(b) Outside control limits due to matrix interference.

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ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV1/08312015 | | |
| **Lab Sample ID:** | JC2870-2 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A382 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | 3W49836.D | 1 | 09/03/15 | YMH | n/a | n/a | V3W1889 |
| Run #2 [a] | 3W49846.D | 1 | 09/03/15 | YMH | n/a | n/a | V3W1890 |

| | Initial Volume |
|---|---|
| Run #1 | 100 ml |
| Run #2 | 100 ml |

**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 67-64-1 | 58.08 | Acetone | 106 | 0.80 | 0.13 | ppbv | | 252 | 1.9 | 0.31 | ug/m3 |
| 106-99-0 | 54.09 | 1,3-Butadiene | ND | 0.80 | 0.12 | ppbv | | ND | 1.8 | 0.27 | ug/m3 |
| 71-43-2 | 78.11 | Benzene | 1.5 | 0.80 | 0.12 | ppbv | | 4.8 | 2.6 | 0.38 | ug/m3 |
| 75-27-4 | 163.8 | Bromodichloromethane | ND | 0.80 | 0.13 | ppbv | | ND | 5.4 | 0.87 | ug/m3 |
| 75-25-2 | 252.8 | Bromoform | ND | 0.80 | 0.082 | ppbv | | ND | 8.3 | 0.85 | ug/m3 |
| 74-83-9 | 94.94 | Bromomethane | ND | 0.80 | 0.087 | ppbv | | ND | 3.1 | 0.34 | ug/m3 |
| 593-60-2 | 106.9 | Bromoethene | ND | 0.80 | 0.081 | ppbv | | ND | 3.5 | 0.35 | ug/m3 |
| 100-44-7 | 126 | Benzyl Chloride | ND | 0.80 | 0.10 | ppbv | | ND | 4.1 | 0.52 | ug/m3 |
| 75-15-0 | 76.14 | Carbon disulfide | ND | 0.80 | 0.11 | ppbv | | ND | 2.5 | 0.34 | ug/m3 |
| 108-90-7 | 112.6 | Chlorobenzene | ND | 0.80 | 0.13 | ppbv | | ND | 3.7 | 0.60 | ug/m3 |
| 75-00-3 | 64.52 | Chloroethane | ND | 0.80 | 0.086 | ppbv | | ND | 2.1 | 0.23 | ug/m3 |
| 67-66-3 | 119.4 | Chloroform | 0.69 | 0.80 | 0.12 | ppbv | J | 3.4 | 3.9 | 0.59 | ug/m3 |
| 74-87-3 | 50.49 | Chloromethane | 0.68 | 0.80 | 0.12 | ppbv | J | 1.4 | 1.7 | 0.25 | ug/m3 |
| 107-05-1 | 76.53 | 3-Chloropropene | ND | 0.80 | 0.11 | ppbv | | ND | 2.5 | 0.34 | ug/m3 |
| 95-49-8 | 126.6 | 2-Chlorotoluene | ND | 0.80 | 0.13 | ppbv | | ND | 4.1 | 0.67 | ug/m3 |
| 56-23-5 | 153.8 | Carbon tetrachloride | ND | 0.80 | 0.098 | ppbv | | ND | 5.0 | 0.62 | ug/m3 |
| 110-82-7 | 84.16 | Cyclohexane | 2.5 | 0.80 | 0.13 | ppbv | | 8.6 | 2.8 | 0.45 | ug/m3 |
| 75-34-3 | 98.96 | 1,1-Dichloroethane | ND | 0.80 | 0.12 | ppbv | | ND | 3.2 | 0.49 | ug/m3 |
| 75-35-4 | 96.94 | 1,1-Dichloroethylene | ND | 0.80 | 0.11 | ppbv | | ND | 3.2 | 0.44 | ug/m3 |
| 106-93-4 | 187.9 | 1,2-Dibromoethane | ND | 0.80 | 0.14 | ppbv | | ND | 6.1 | 1.1 | ug/m3 |
| 107-06-2 | 98.96 | 1,2-Dichloroethane | ND | 0.80 | 0.10 | ppbv | | ND | 3.2 | 0.40 | ug/m3 |
| 78-87-5 | 113 | 1,2-Dichloropropane | ND | 0.80 | 0.20 | ppbv | | ND | 3.7 | 0.92 | ug/m3 |
| 123-91-1 | 88.12 | 1,4-Dioxane | ND | 0.80 | 0.25 | ppbv | | ND | 2.9 | 0.90 | ug/m3 |
| 75-71-8 | 120.9 | Dichlorodifluoromethane | 0.48 | 0.80 | 0.15 | ppbv | J | 2.4 | 4.0 | 0.74 | ug/m3 |
| 124-48-1 | 208.3 | Dibromochloromethane | ND | 0.80 | 0.17 | ppbv | | ND | 6.8 | 1.4 | ug/m3 |
| 156-60-5 | 96.94 | trans-1,2-Dichloroethylene | ND | 0.80 | 0.081 | ppbv | | ND | 3.2 | 0.32 | ug/m3 |
| 156-59-2 | 96.94 | cis-1,2-Dichloroethylene | ND | 0.80 | 0.099 | ppbv | | ND | 3.2 | 0.39 | ug/m3 |
| 10061-01-5 | 111 | cis-1,3-Dichloropropene | ND | 0.80 | 0.14 | ppbv | | ND | 3.6 | 0.64 | ug/m3 |
| 541-73-1 | 147 | m-Dichlorobenzene | ND | 0.80 | 0.11 | ppbv | | ND | 4.8 | 0.66 | ug/m3 |
| 95-50-1 | 147 | o-Dichlorobenzene | ND | 0.80 | 0.12 | ppbv | | ND | 4.8 | 0.72 | ug/m3 |
| 106-46-7 | 147 | p-Dichlorobenzene | ND | 0.80 | 0.077 | ppbv | | ND | 4.8 | 0.46 | ug/m3 |
| 10061-02-6 | 111 | trans-1,3-Dichloropropene | ND | 0.80 | 0.082 | ppbv | | ND | 3.6 | 0.37 | ug/m3 |

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

# Report of Analysis



| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV1/08312015 | | |
| **Lab Sample ID:** | JC2870-2 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A382 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |



**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 64-17-5 | 46.07 | Ethanol | 27.6 | 2.0 | 0.66 | ppbv | | 52.0 | 3.8 | 1.2 | ug/m3 |
| 100-41-4 | 106.2 | Ethylbenzene | 0.76 | 0.80 | 0.19 | ppbv | J | 3.3 | 3.5 | 0.83 | ug/m3 |
| 141-78-6 | 88 | Ethyl Acetate | 3.4 | 0.80 | 0.25 | ppbv | | 12 | 2.9 | 0.90 | ug/m3 |
| 622-96-8 | 120.2 | 4-Ethyltoluene | 0.36 | 0.80 | 0.088 | ppbv | J | 1.8 | 3.9 | 0.43 | ug/m3 |
| 76-13-1 | 187.4 | Freon 113 | ND | 0.80 | 0.11 | ppbv | | ND | 6.1 | 0.84 | ug/m3 |
| 76-14-2 | 170.9 | Freon 114 | ND | 0.80 | 0.10 | ppbv | | ND | 5.6 | 0.70 | ug/m3 |
| 142-82-5 | 100.2 | Heptane | ND | 0.80 | 0.12 | ppbv | | ND | 3.3 | 0.49 | ug/m3 |
| 87-68-3 | 260.8 | Hexachlorobutadiene | ND | 0.80 | 0.13 | ppbv | | ND | 8.5 | 1.4 | ug/m3 |
| 110-54-3 | 86.17 | Hexane | 0.86 | 0.80 | 0.11 | ppbv | | 3.0 | 2.8 | 0.39 | ug/m3 |
| 591-78-6 | 100 | 2-Hexanone | ND | 0.80 | 0.18 | ppbv | | ND | 3.3 | 0.74 | ug/m3 |
| 67-63-0 | 60.1 | Isopropyl Alcohol | 13.3 | 0.80 | 0.48 | ppbv | | 32.7 | 2.0 | 1.2 | ug/m3 |
| 75-09-2 | 84.94 | Methylene chloride | 0.80 | 0.80 | 0.54 | ppbv | | 2.8 | 2.8 | 1.9 | ug/m3 |
| 78-93-3 | 72.11 | Methyl ethyl ketone | 22.5 | 0.80 | 0.19 | ppbv | | 66.4 | 2.4 | 0.56 | ug/m3 |
| 108-10-1 | 100.2 | Methyl Isobutyl Ketone | ND | 0.80 | 0.11 | ppbv | | ND | 3.3 | 0.45 | ug/m3 |
| 1634-04-4 | 88.15 | Methyl Tert Butyl Ether | ND | 0.80 | 0.10 | ppbv | | ND | 2.9 | 0.36 | ug/m3 |
| 80-62-6 | 100.12 | Methylmethacrylate | ND | 0.80 | 0.12 | ppbv | | ND | 3.3 | 0.49 | ug/m3 |
| 115-07-1 | 42 | Propylene | 15.0 | 2.0 | 0.32 | ppbv | | 25.8 | 3.4 | 0.55 | ug/m3 |
| 100-42-5 | 104.1 | Styrene | ND | 0.80 | 0.10 | ppbv | | ND | 3.4 | 0.43 | ug/m3 |
| 71-55-6 | 133.4 | 1,1,1-Trichloroethane | ND | 0.80 | 0.13 | ppbv | | ND | 4.4 | 0.71 | ug/m3 |
| 79-34-5 | 167.9 | 1,1,2,2-Tetrachloroethane | ND | 0.80 | 0.12 | ppbv | | ND | 5.5 | 0.82 | ug/m3 |
| 79-00-5 | 133.4 | 1,1,2-Trichloroethane | ND | 0.80 | 0.14 | ppbv | | ND | 4.4 | 0.76 | ug/m3 |
| 120-82-1 | 181.5 | 1,2,4-Trichlorobenzene | ND | 0.80 | 0.18 | ppbv | | ND | 5.9 | 1.3 | ug/m3 |
| 95-63-6 | 120.2 | 1,2,4-Trimethylbenzene | 2.1 | 0.80 | 0.092 | ppbv | | 10 | 3.9 | 0.45 | ug/m3 |
| 108-67-8 | 120.2 | 1,3,5-Trimethylbenzene | 2.0 | 0.80 | 0.12 | ppbv | | 9.8 | 3.9 | 0.59 | ug/m3 |
| 540-84-1 | 114.2 | 2,2,4-Trimethylpentane | ND | 0.80 | 0.085 | ppbv | | ND | 3.7 | 0.40 | ug/m3 |
| 75-65-0 | 74.12 | Tertiary Butyl Alcohol | 1.1 | 0.80 | 0.20 | ppbv | | 3.3 | 2.4 | 0.61 | ug/m3 |
| 127-18-4 | 165.8 | Tetrachloroethylene | ND | 0.16 | 0.095 | ppbv | | ND | 1.1 | 0.64 | ug/m3 |
| 109-99-9 | 72.11 | Tetrahydrofuran | ND | 0.80 | 0.17 | ppbv | | ND | 2.4 | 0.50 | ug/m3 |
| 108-88-3 | 92.14 | Toluene | 1.4 | 0.80 | 0.081 | ppbv | | 5.3 | 3.0 | 0.31 | ug/m3 |
| 79-01-6 | 131.4 | Trichloroethylene | ND | 0.16 | 0.10 | ppbv | | ND | 0.86 | 0.54 | ug/m3 |
| 75-69-4 | 137.4 | Trichlorofluoromethane | ND | 0.80 | 0.081 | ppbv | | ND | 4.5 | 0.46 | ug/m3 |
| 75-01-4 | 62.5 | Vinyl chloride | ND | 0.80 | 0.13 | ppbv | | ND | 2.0 | 0.33 | ug/m3 |
| 108-05-4 | 86 | Vinyl Acetate | ND | 0.80 | 0.22 | ppbv | | ND | 2.8 | 0.77 | ug/m3 |
| | 106.2 | m,p-Xylene | 1.6 | 0.80 | 0.17 | ppbv | | 6.9 | 3.5 | 0.74 | ug/m3 |
| 95-47-6 | 106.2 | o-Xylene | 1.0 | 0.80 | 0.10 | ppbv | | 4.3 | 3.5 | 0.43 | ug/m3 |
| 1330-20-7 | 106.2 | Xylenes (total) | 2.6 | 0.80 | 0.10 | ppbv | | 11 | 3.5 | 0.43 | ug/m3 |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 460-00-4 | 4-Bromofluorobenzene | 36% [b] | 39% [b] | 65-128% |

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV1/08312015 | | |
| **Lab Sample ID:** | JC2870-2 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A382 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|

(a) Confirmation run.
(b) Outside control limits due to matrix interference.

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ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest LabLink@872636 09:45 14-Sep-2015

# Report of Analysis





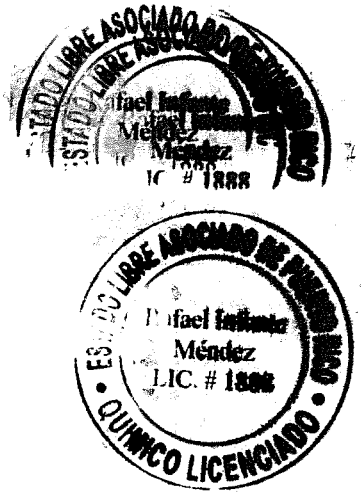
| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV1/08312015 | | |
| **Lab Sample ID:** | JC2870-2 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A382 | **Date Received:** | 09/02/15 |
| **Method:** | EPA TO-3 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | QT19196.D | 1 | 09/04/15 | TCH | n/a | n/a | GQT1156 |
| Run #2 | | | | | | | |

| | Initial Volume |
|---|---|
| Run #1 | 0.50 ml |
| Run #2 | |

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 74-82-8 | 16 | Methane | 121 | 5.0 | 0.33 | ppmv | | 79.2 | 3.3 | 0.22 | mg/m3 |
| 74-98-6 | 44 | Propane | ND | 0.50 | 0.041 | ppmv | | ND | 0.90 | 0.074 | mg/m3 |
| 106-97-8 | 58 | n-Butane | ND | 0.50 | 0.060 | ppmv | | ND | 1.2 | 0.14 | mg/m3 |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 460-00-4 | 4-Bromofluorobenzene | 95% | | 61-137% |
| 460-00-4 | 4-Bromofluorobenzene | 93% | | 61-137% |




ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest LabLink@872636 09:45 14-Sep-2015

# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV1D/08312015 | | |
| **Lab Sample ID:** | JC2870-3 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A1154 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | 3W49847.D | 1 | 09/03/15 | YMH | n/a | n/a | V3W1890 |
| Run #2 [a] | 3W49837.D | 1 | 09/03/15 | YMH | n/a | n/a | V3W1889 |

| | Initial Volume |
|---|---|
| Run #1 | 50.0 ml |
| Run #2 | 20.0 ml |

**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 67-64-1 | 58.08 | Acetone | 88.3 | 1.6 | 0.25 | ppbv | | 210 | 3.8 | 0.59 | ug/m3 |
| 106-99-0 | 54.09 | 1,3-Butadiene | ND | 1.6 | 0.25 | ppbv | | ND | 3.5 | 0.55 | ug/m3 |
| 71-43-2 | 78.11 | Benzene | 1.4 | 1.6 | 0.24 | ppbv | J | 4.5 | 5.1 | 0.77 | ug/m3 |
| 75-27-4 | 163.8 | Bromodichloromethane | ND | 1.6 | 0.25 | ppbv | | ND | 11 | 1.7 | ug/m3 |
| 75-25-2 | 252.8 | Bromoform | ND | 1.6 | 0.16 | ppbv | | ND | 17 | 1.7 | ug/m3 |
| 74-83-9 | 94.94 | Bromomethane | ND | 1.6 | 0.17 | ppbv | | ND | 6.2 | 0.66 | ug/m3 |
| 593-60-2 | 106.9 | Bromoethene | ND | 1.6 | 0.16 | ppbv | | ND | 7.0 | 0.70 | ug/m3 |
| 100-44-7 | 126 | Benzyl Chloride | ND | 1.6 | 0.21 | ppbv | | ND | 8.2 | 1.1 | ug/m3 |
| 75-15-0 | 76.14 | Carbon disulfide | ND | 1.6 | 0.23 | ppbv | | ND | 5.0 | 0.72 | ug/m3 |
| 108-90-7 | 112.6 | Chlorobenzene | ND | 1.6 | 0.26 | ppbv | | ND | 7.4 | 1.2 | ug/m3 |
| 75-00-3 | 64.52 | Chloroethane | ND | 1.6 | 0.17 | ppbv | | ND | 4.2 | 0.45 | ug/m3 |
| 67-66-3 | 119.4 | Chloroform | ND | 1.6 | 0.25 | ppbv | | ND | 7.8 | 1.2 | ug/m3 |
| 74-87-3 | 50.49 | Chloromethane | ND | 1.6 | 0.23 | ppbv | | ND | 3.3 | 0.47 | ug/m3 |
| 107-05-1 | 76.53 | 3-Chloropropene | ND | 1.6 | 0.22 | ppbv | | ND | 5.0 | 0.69 | ug/m3 |
| 95-49-8 | 126.6 | 2-Chlorotoluene | ND | 1.6 | 0.26 | ppbv | | ND | 8.3 | 1.3 | ug/m3 |
| 56-23-5 | 153.8 | Carbon tetrachloride | ND | 1.6 | 0.20 | ppbv | | ND | 10 | 1.3 | ug/m3 |
| 110-82-7 | 84.16 | Cyclohexane | 2.2 | 1.6 | 0.26 | ppbv | | 7.6 | 5.5 | 0.89 | ug/m3 |
| 75-34-3 | 98.96 | 1,1-Dichloroethane | ND | 1.6 | 0.25 | ppbv | | ND | 6.5 | 1.0 | ug/m3 |
| 75-35-4 | 96.94 | 1,1-Dichloroethylene | ND | 1.6 | 0.23 | ppbv | | ND | 6.3 | 0.91 | ug/m3 |
| 106-93-4 | 187.9 | 1,2-Dibromoethane | ND | 1.6 | 0.28 | ppbv | | ND | 12 | 2.2 | ug/m3 |
| 107-06-2 | 98.96 | 1,2-Dichloroethane | ND | 1.6 | 0.21 | ppbv | | ND | 6.5 | 0.85 | ug/m3 |
| 78-87-5 | 113 | 1,2-Dichloropropane | ND | 1.6 | 0.40 | ppbv | | ND | 7.4 | 1.8 | ug/m3 |
| 123-91-1 | 88.12 | 1,4-Dioxane | ND | 1.6 | 0.50 | ppbv | | ND | 5.8 | 1.8 | ug/m3 |
| 75-71-8 | 120.9 | Dichlorodifluoromethane | ND | 1.6 | 0.29 | ppbv | | ND | 7.9 | 1.4 | ug/m3 |
| 124-48-1 | 208.3 | Dibromochloromethane | ND | 1.6 | 0.33 | ppbv | | ND | 14 | 2.8 | ug/m3 |
| 156-60-5 | 96.94 | trans-1,2-Dichloroethylene | ND | 1.6 | 0.16 | ppbv | | ND | 6.3 | 0.63 | ug/m3 |
| 156-59-2 | 96.94 | cis-1,2-Dichloroethylene | ND | 1.6 | 0.20 | ppbv | | ND | 6.3 | 0.79 | ug/m3 |
| 10061-01-5 | 111 | cis-1,3-Dichloropropene | ND | 1.6 | 0.28 | ppbv | | ND | 7.3 | 1.3 | ug/m3 |
| 541-73-1 | 147 | m-Dichlorobenzene | ND | 1.6 | 0.22 | ppbv | | ND | 9.6 | 1.3 | ug/m3 |
| 95-50-1 | 147 | o-Dichlorobenzene | ND | 1.6 | 0.24 | ppbv | | ND | 9.6 | 1.4 | ug/m3 |
| 106-46-7 | 147 | p-Dichlorobenzene | ND | 1.6 | 0.15 | ppbv | | ND | 9.6 | 0.90 | ug/m3 |
| 10061-02-6 | 111 | trans-1,3-Dichloropropene | ND | 1.6 | 0.16 | ppbv | | ND | 7.3 | 0.73 | ug/m3 |

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Rafael Infante Méndez
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# Report of Analysis



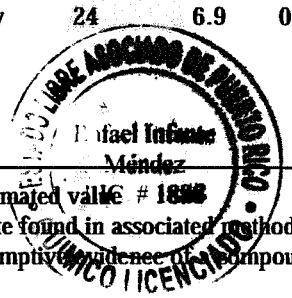


| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV1D/08312015 | | |
| **Lab Sample ID:** | JC2870-3 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A1154 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 64-17-5 | 46.07 | Ethanol | 24.1 | 4.0 | 1.3 | ppbv | | 45.4 | 7.5 | 2.4 | ug/m3 |
| 100-41-4 | 106.2 | Ethylbenzene | 1.7 | 1.6 | 0.38 | ppbv | | 7.4 | 6.9 | 1.7 | ug/m3 |
| 141-78-6 | 88 | Ethyl Acetate | 3.0 | 1.6 | 0.51 | ppbv | | 11 | 5.8 | 1.8 | ug/m3 |
| 622-96-8 | 120.2 | 4-Ethyltoluene | 0.87 | 1.6 | 0.18 | ppbv | J | 4.3 | 7.9 | 0.88 | ug/m3 |
| 76-13-1 | 187.4 | Freon 113 | ND | 1.6 | 0.22 | ppbv | | ND | 12 | 1.7 | ug/m3 |
| 76-14-2 | 170.9 | Freon 114 | ND | 1.6 | 0.20 | ppbv | | ND | 11 | 1.4 | ug/m3 |
| 142-82-5 | 100.2 | Heptane | ND | 1.6 | 0.24 | ppbv | | ND | 6.6 | 0.98 | ug/m3 |
| 87-68-3 | 260.8 | Hexachlorobutadiene | ND | 1.6 | 0.26 | ppbv | | ND | 17 | 2.8 | ug/m3 |
| 110-54-3 | 86.17 | Hexane | ND | 1.6 | 0.22 | ppbv | | ND | 5.6 | 0.78 | ug/m3 |
| 591-78-6 | 100 | 2-Hexanone | ND | 1.6 | 0.35 | ppbv | | ND | 6.5 | 1.4 | ug/m3 |
| 67-63-0 | 60.1 | Isopropyl Alcohol | 12.7 | 1.6 | 0.96 | ppbv | | 31.2 | 3.9 | 2.4 | ug/m3 |
| 75-09-2 | 84.94 | Methylene chloride | 1.6 | 1.6 | 1.1 | ppbv | | 5.6 | 5.6 | 3.8 | ug/m3 |
| 78-93-3 | 72.11 | Methyl ethyl ketone | 18.0 | 1.6 | 0.39 | ppbv | | 53.1 | 4.7 | 1.2 | ug/m3 |
| 108-10-1 | 100.2 | Methyl Isobutyl Ketone | ND | 1.6 | 0.22 | ppbv | | ND | 6.6 | 0.90 | ug/m3 |
| 1634-04-4 | 88.15 | Methyl Tert Butyl Ether | ND | 1.6 | 0.21 | ppbv | | ND | 5.8 | 0.76 | ug/m3 |
| 80-62-6 | 100.12 | Methylmethacrylate | ND | 1.6 | 0.24 | ppbv | | ND | 6.6 | 0.98 | ug/m3 |
| 115-07-1 | 42 | Propylene | 20.9 | 4.0 | 0.65 | ppbv | | 35.9 | 6.9 | 1.1 | ug/m3 |
| 100-42-5 | 104.1 | Styrene | ND | 1.6 | 0.21 | ppbv | | ND | 6.8 | 0.89 | ug/m3 |
| 71-55-6 | 133.4 | 1,1,1-Trichloroethane | ND | 1.6 | 0.25 | ppbv | | ND | 8.7 | 1.4 | ug/m3 |
| 79-34-5 | 167.9 | 1,1,2,2-Tetrachloroethane | ND | 1.6 | 0.24 | ppbv | | ND | 11 | 1.6 | ug/m3 |
| 79-00-5 | 133.4 | 1,1,2-Trichloroethane | ND | 1.6 | 0.28 | ppbv | | ND | 8.7 | 1.5 | ug/m3 |
| 120-82-1 | 181.5 | 1,2,4-Trichlorobenzene | ND | 1.6 | 0.35 | ppbv | | ND | 12 | 2.6 | ug/m3 |
| 95-63-6 | 120.2 | 1,2,4-Trimethylbenzene | 3.7 | 1.6 | 0.18 | ppbv | | 18 | 7.9 | 0.88 | ug/m3 |
| 108-67-8 | 120.2 | 1,3,5-Trimethylbenzene | 3.9 | 1.6 | 0.24 | ppbv | | 19 | 7.9 | 1.2 | ug/m3 |
| 540-84-1 | 114.2 | 2,2,4-Trimethylpentane | ND | 1.6 | 0.17 | ppbv | | ND | 7.5 | 0.79 | ug/m3 |
| 75-65-0 | 74.12 | Tertiary Butyl Alcohol | 1.4 | 1.6 | 0.40 | ppbv | J | 4.2 | 4.9 | 1.2 | ug/m3 |
| 127-18-4 | 165.8 | Tetrachloroethylene | ND | 0.32 | 0.19 | ppbv | | ND | 2.2 | 1.3 | ug/m3 |
| 109-99-9 | 72.11 | Tetrahydrofuran | ND | 1.6 | 0.35 | ppbv | | ND | 4.7 | 1.0 | ug/m3 |
| 108-88-3 | 92.14 | Toluene | 2.2 | 1.6 | 0.16 | ppbv | | 8.3 | 6.0 | 0.60 | ug/m3 |
| 79-01-6 | 131.4 | Trichloroethylene | ND | 0.32 | 0.20 | ppbv | | ND | 1.7 | 1.1 | ug/m3 |
| 75-69-4 | 137.4 | Trichlorofluoromethane | ND | 1.6 | 0.16 | ppbv | | ND | 9.0 | 0.90 | ug/m3 |
| 75-01-4 | 62.5 | Vinyl chloride | ND | 1.6 | 0.26 | ppbv | | ND | 4.1 | 0.66 | ug/m3 |
| 108-05-4 | 86 | Vinyl Acetate | ND | 1.6 | 0.44 | ppbv | | ND | 5.6 | 1.5 | ug/m3 |
| | 106.2 | m,p-Xylene | 3.8 | 1.6 | 0.35 | ppbv | | 17 | 6.9 | 1.5 | ug/m3 |
| 95-47-6 | 106.2 | o-Xylene | 1.7 | 1.6 | 0.21 | ppbv | | 7.4 | 6.9 | 0.91 | ug/m3 |
| 1330-20-7 | 106.2 | Xylenes (total) | 5.5 | 1.6 | 0.21 | ppbv | | 24 | 6.9 | 0.91 | ug/m3 |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 460-00-4 | 4-Bromofluorobenzene | 55% [b] | 82% | 65-128% |




Rafael Infante Méndez # 1888

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

# Report of Analysis



| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV1D/08312015 | | |
| **Lab Sample ID:** | JC2870-3 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A1154 | **Date Received:** | 09/02/15 |
| **Method:** | TO-15 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |



**VOA TO15 List**

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|

(a) Confirmation run.
(b) Outside control limits due to matrix interference.

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Rafael Infante Méndez
LIC. # 1882
QUIMICO LICENCIADO

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: QT19209.D

Accutest LabLink@872636 09:45 14-Sep-2015

# Report of Analysis





| | | | |
|---|---|---|---|
| **Client Sample ID:** | B8-SSV1D/08312015 | | |
| **Lab Sample ID:** | JC2870-3 | **Date Sampled:** | 08/31/15 |
| **Matrix:** | AIR - Soil Vapor Comp. Summa ID: A1154 | **Date Received:** | 09/02/15 |
| **Method:** | EPA TO-3 | **Percent Solids:** | n/a |
| **Project:** | BMSMC, Building 5 Area, PR | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | QT19209.D | 1.52 | 09/04/15 | TCH | n/a | n/a | GQT1157 |
| Run #2 | | | | | | | |

| | Initial Volume |
|---|---|
| Run #1 | 0.50 ml |
| Run #2 | |

| CAS No. | MW | Compound | Result | RL | MDL | Units | Q | Result | RL | MDL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 74-82-8 | 16 | Methane | 197 | 7.6 | 0.51 | ppmv | | 129 | 5.0 | 0.33 | mg/m3 |
| 74-98-6 | 44 | Propane | ND | 0.76 | 0.063 | ppmv | | ND | 1.4 | 0.11 | mg/m3 |
| 106-97-8 | 58 | n-Butane | ND | 0.76 | 0.091 | ppmv | | ND | 1.8 | 0.22 | mg/m3 |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 460-00-4 | 4-Bromofluorobenzene | 102% | | 61-137% |
| 460-00-4 | 4-Bromofluorobenzene | 103% | | 61-137% |


ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

# CHAIN OF CUSTODY

ACCUTEST LABORATORIES

**Air Sampling Field Data Sheet**

8012M535068 | MS-8/18/2015-7 | PAGE 1 OF 1

Lab Quote # | Lab Job # JC2870

**Client / Reporting Information**

Company Name: AMAI
Address: 2700 Westchester Ave. Suite 417
City: Purchase State: NY Zip: 10577
Project Contact: Terry Taylor E-mail: ttaylor@amaiconsult.com
Phone #: 914-251-0700 ext 309 Fax #:
Sampler(s) Name(s):

**Project Information**

Project Name: Building 8 VI
Street: RD #3, km 77.5
City: Humacao State: PR
Project #:
Client Purchase Order #:

**Weather Parameters**

Temperature (Fahrenheit) Start: 87° Stop: 87° Maximum: Minimum:
Atmospheric Pressure (inches of Hg) Start: 30" Stop: 30" Maximum: 30" Minimum:
Other weather comment:

| Lab Sample # | Field ID / Point of Collection | Air Type: Indoor(I) Soil Vap(SV) Ambient(A) | Sampling Equipment Info: Canister Serial # | Canister Size 6L or 1L | Flow Controller Serial # | Start Sampling Information: Date | Time (24hr clock) | Canister Pressure ("Hg) | Interior Temp (F) | Sampler Init. | Stop Sampling Information: Date | Time (24hr clock) | Canister Pressure ("Hg) | Interior Temp (F) | Sampler Init. | Requested Analysis: Standard TO-15 Reporting List | Methane |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | B8-SSV2/05312015 | SV | A1216 | 1 | 428 | 5/31/15 | 1245 | 29 | 96 | [illegible] | 5/31/15 | 1249 | 5 | 96 | [illegible] | X | X |
| 2 | B8-SSV1/05312015 | SV | 382 | 1 | 533 | 5/31/15 | 1525 | 30 | 96 | [illegible] | 5/31/15 | 1532 | 5 | 96 | [illegible] | X | X |
| 3 | B8-SSV1D/05312015 | SV | 1154 | 1 | 349 | 5/31/15 | 1525 | 28 | 96 | [illegible] | 5/31/15 | 1531 | 5 | 96 | [illegible] | X | X |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
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**Turnaround Time (Business days)**

Standard - 15 Days
10 Day
5 Day
3 Day X
2 Day
1 Day
Other

INITIAL ASSESSMENT: HL4A
LABEL VERIFICATION: CB

**Data Deliverable Information**

All NJDEP TO-15 is mandatory Full T1
Comm A
Comm B
Reduced T2
Full T1 X
Other:

**Comments / Remarks**

Sample B8-SSV2/05312015 contains approximately 18% of an unknown gas as determined by the the detector. The gas is NOT He.

**Sample Custody must be documented below each time samples change possession, including courier delivery.**

| | Relinquished by Lab | Date Time | Received By | Relinquished By | Date Time | Received By |
|---|---|---|---|---|---|---|
| 1 | Ray Maiorano | 8/19/15 8:30 | 1 FedEx | 2 FedEx | 8/21/15 1000 | 2 [illegible] |
| 3 | [illegible] 9-1-15 1300 | 9-1-15 1300 | 3 FED EX | 4 FEDEX | 9/2/15 10:10 | 4 [illegible] |
| 5 | | | 5 | Custody Seal # 868 | | |

5.1.5 Methane

DATA REVIEW WORKSHEETS

Project Number:_____jc2870-1_____
Date:_____08/311/2015_____

# REVIEW OF VOLATILE ORGANIC PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: QC criteria from "Compendium Method TO-15. Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters and Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS), January, 1999"; USEPA Hazardous Waste Support Branch. Validating Air Samples. Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15, (SOP # HW-31. Revision #4. October, 2006). The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.
The hardcopied (laboratory name) _Eurofins_-_Air_Toxics_____ data package received has been reviewed and the quality control and performance data summarized. The data review for VOCs included:

Lab. Project/SDG No.: __jc2870-1_____ Sample matrix: ___Air_____
No. of Samples: _____3_____

Trip blank No.: ____-_____
Field blank No.: _____-_____
Equipment blank No.:___-_____
Field duplicate No.:_____B8-SSV1/B8-SSV2_____

___X___ Data Completeness
___X___ Holding Times
___X___ GC/MS Tuning
___X___ Internal Standard Performance
___X___ Blanks
___X___ Surrogate Recoveries
___N/A_ Matrix Spike/Matrix Spike Duplicate
___X___ Laboratory Control Spikes
___X___ Field Duplicates
___X___ Calibrations
___X___ Compound Identifications
___X___ Compound Quantitation
___X___ Quantitation Limits

Overall Comments:_VOCs_by_method_TO-15_____
_____

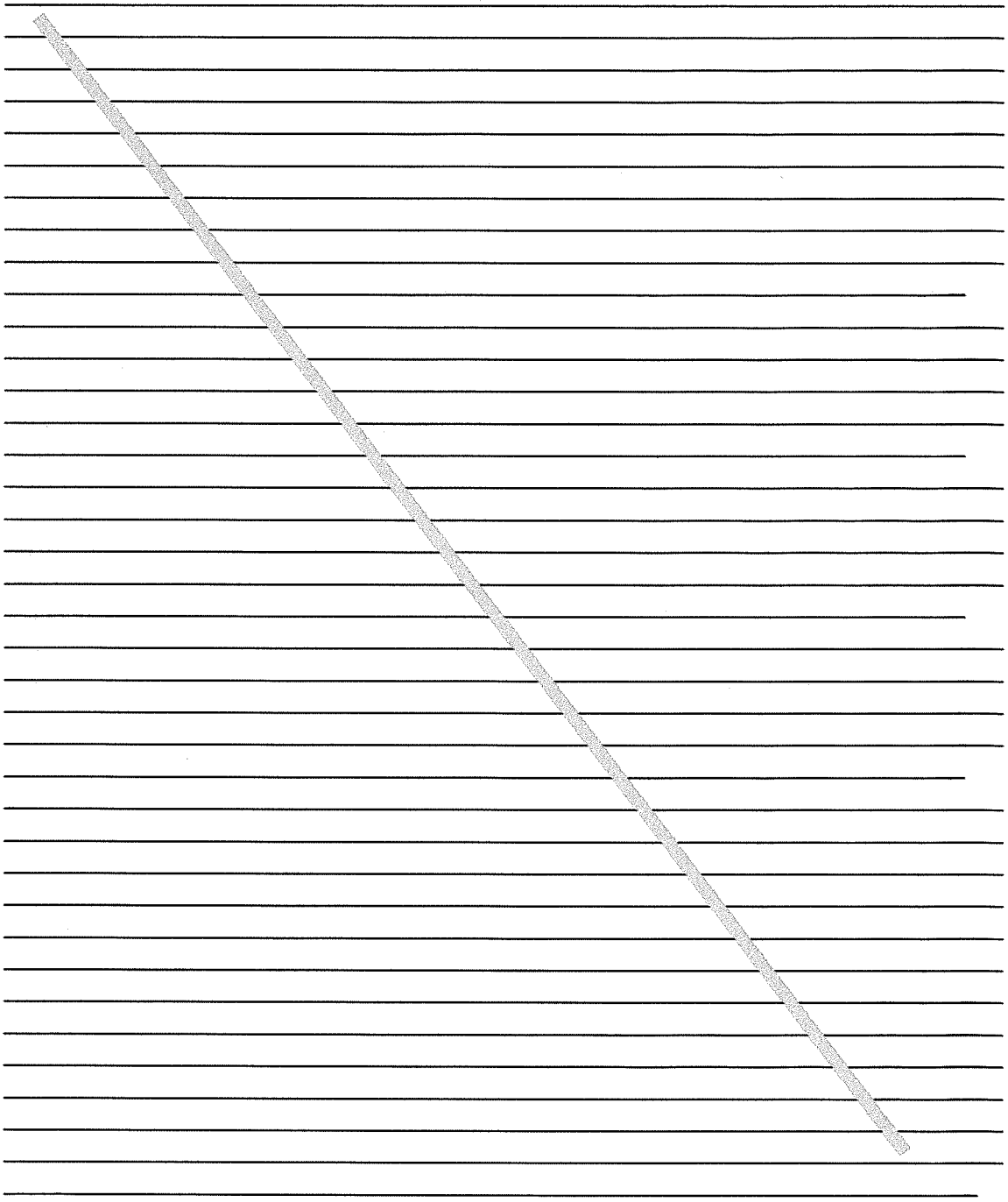
Definition of Qualifiers:
J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer:_____
Date:__ 09/15/2015_____

DATA REVIEW WORKSHEETS

## DATA COMPLETENESS

| MISSING INFORMATION | DATE LAB. CONTACTED | DATE RECEIVED |
|---|---|---|



All criteria were met __X__
Criteria were not met
and/or see below _____

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

| SAMPLE ID | DATE SAMPLED | DATE ANALYZED | pH | ACTION |
|---|---|---|---|---|
| | | | | |
| | | | | |
| All samples analyzed within the recommended method holding time | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Criteria

Aqueous samples – 14 days from sample collection for preserved samples (pH $\leq$ 2, 4°C), no air bubbles.
Aqueous samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles.
Soil samples- 7 days from sample collection.
Cooler temperature (Criteria: 4 $\pm$ 2 °C): N/A – summa canisters

Actions

If the VOCs vial(s) have air bubbles, estimate positive results (J) and reject nondetects (R).
If the % solids of soil samples is 10-50%, estimates positive results (J) and nondetects (UJ)
If the % solid of soil samples is < 10%, estimate positive results (J) and reject nondetects (R).
If holding times are exceeded but < 14 days beyond criteria, estimate positive results (J) and nondetects (UJ).
If holding times are exceeded but < 28 days beyond criteria, estimate positive results (J) and reject nondetects (R).
If holding times are grossly exceeded (> 28 days beyond criteria), reject all results (R).
If samples were not iced or if the ice were melted (> 10°C), estimate positive results (J) and nondetects (UJ).

All criteria were met __X___
Criteria were not met see below _____

GC/MS TUNING

The assessment of the tuning results is to determine if the sample instrumentation is within the standard tuning QC limits

__X___ The BFB performance results were reviewed and found to be within the specified criteria.

__X___ BFB tuning was performed for every 24 hours of sample analysis.

If no, use professional judgment to determine whether the associated data should be accepted, qualified or rejected.

List the samples affected:
_____

If mass calibration is in error, all associated data are rejected.

All criteria were met __X___
Criteria were not met
and/or see below _____

## CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____07/16/15;___08/14/15;___08/28/15_____
Dates of continuing calibration:____07/29/15;___08/29/15;___09/02/15__09/03/15_____
Instrument ID numbers:_____GCMS3W_____
Matrix/Level:_____Air/low_____

| DATE | LAB FILE ID# | CRITERIA OUT RFs, %RSD, %D, r | COMPOUND | SAMPLES AFFECTED |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| Initial and continuing calibration met the method performance criteria. | | | | |
| | | | | |
| | | | | |
| | | | | |

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.
All %RSD must be ≤ 15 % regardless of method requirements for CCC.
All %Ds must be ≤ 30% regardless of method requirements for CCC.
Method TO-15 does not specify criterion for the curve correlation coefficient (r). A limit for r of ≥ 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.
If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.
If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 30%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 30%, estimate positive results (J) and nondetects (UJ).
If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has r < 0.995, estimate positive results and nondetects.

A separate worksheet should be filled for each initial curve

All criteria were met __X___
Criteria were not met
and/or see below _____

## CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____08/06/15_____
Dates of continuing calibration:____08/07/15_____
Instrument ID numbers:_____GCMS5W_____
Matrix/Level:_____Air/low_____

| DATE | LAB FILE ID# | CRITERIA OUT RFs, %RSD, %D, r | COMPOUND | SAMPLES AFFECTED |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| Initial and continuing calibration met the method performance criteria. | | | | |
| | | | | |
| | | | | |
| | | | | |

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.
All %RSD must be ≤ 15 % regardless of method requirements for CCC.
All %Ds must be ≤ 30% regardless of method requirements for CCC.
Method TO-15 does not specify criterion for the curve correlation coefficient (r). A limit for r of ≥ 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.
If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.
If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 30%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 30%, estimate positive results (J) and nondetects (UJ).
If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has r < 0.995, estimate positive results and nondetects.

A separate worksheet should be filled for each initial curve

All criteria were met ___X___
Criteria were not met
and/or see below _____

## V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

| DATE ANALYZED | LAB ID | LEVEL/ MATRIX | COMPOUND | CONCENTRATION/ UNITS |
|---|---|---|---|---|
| ____All_method_blank_meeth_method_specific_criteria_____ | | | | |
| ____Summa_canisters_met_cleaning_certification_criteria_____ | | | | |

Field/Equipment/Trip blank

| DATE ANALYZED | LAB ID | LEVEL/ MATRIX | COMPOUND | CONCENTRATION UNITS |
|---|---|---|---|---|
| No_field/trip/equipment_blanks_analyzed_with_this_data_package._____ | | | | |

All criteria were met __X___
Criteria were not met
and/or see below _____

## V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

ALs = 10x the amount of common contaminants (methylene chloride, acetone, 2-butanone, and toluene)
ALs = 5x for any other compounds

Specific actions are as follows:

If the concentration is < sample quantitation limit (SQL) and $\leq$ AL, report the compound as not detected (U) at the SQL.
If the concentration is $\geq$ SQL but $\leq$ AL, report the compound as not detected (U) at the reported concentration.
If the concentration is $\geq$ SQL and > AL, report the concentration unqualified.

Notes:

High and low level blanks must be treated separately
Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

| CONTAMINATION SOURCE/LEVEL | COMPOUND | CONC/UNITS | AL/UNITS | SQL | AFFECTED SAMPLES |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

All criteria were met ____
Criteria were not met
and/or see below ___X___

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.
List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.
Matrix: solid/aqueous

| SAMPLE ID | SURROGATE COMPOUND | | | ACTION |
|---|---|---|---|---|
| | 1,2-DICHLOROETHANE-d4 | Toluene-d8 | 4-BFB | |
| _4-BFB_used_as_surrogate;_recoveries_within_laboratory_control_limits_except_for_the_followings: | | | | |
| _JC2870-2 | | | 39_% | No_action |
| _JC2870-2 | | | 36_% | No_action |
| _JC2870-3 | | | 55_% | No_action |
| _JC2870-1A | | | 22_% | No_action |
| _JC2870-1A | | | 23_% | No_action |

QC Limits* (Air)

_____LL_to_UL_____to_____ ____to____ _65__to_128__

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 80 – 120 % for aqueous and 70 – 130 % for solid samples.

Actions:

| QUALITY | %R < 10% | %R = 10% - LL | %R > UL |
|---|---|---|---|
| Positive results | J | J | J |
| Nondetects results | R | UJ | Accept |

Surrogate action should be applied:

If one or more surrogate in the VOC fraction is out of specification, but has a recovery of > 10%.

If any one surrogate in a fraction shows < 10 % recovery.

All criteria were met _____
Criteria were not met
and/or see below __N/A____

## VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.
Sample ID:_____ Matrix/Level:_____

| MS OR MSD | COMPOUND | % R | RPD | QC LIMITS | ACTION |
|---|---|---|---|---|---|
| MS/MSD are not required as part of Method TO-15; blank spike used to assess accuracy | | | | | |

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

| QUALITY | %R < LL | %R > UL |
|---|---|---|
| Positive results | J | J |
| Nondetects results | R | Accept |

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).
If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).
If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

All criteria were met _____
Criteria were not met
and/or see below __N/A___

## VII. B MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD – Unspiked Compounds

It should be noted that Method TO-15 does not specify a MS/MSD criteria for the unspiked compounds in the sample. A %RSD of < 50% has therefore been utilized as professional judgment.

If all target analytes were spiked in the MS/MSD, this review element is not applicable.

List the %RSD of the compounds which do not meet the criteria.

Sample ID:_____ Matrix/Level/Unit:_____

| COMPOUND | SAMPLE CONC. | MS CONC. | MSD CONC. | % RSD | ACTION |
|---|---|---|---|---|---|

Actions:

* If the % RSD > 50, qualify the positive result in the unspiked samples as estimated (J).
* If the % RSD is not calculated (NC) due to nondetected value, use professional judgment to qualify the data.

All criteria were met _____
Criteria were not met
and/or see below ___X___

VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? Yes or No. If no make note in data review memo.
List the %R of compounds which do not meet the criteria

| LCS ID | COMPOUND | % R | QC LIMIT |
|---|---|---|---|

___Blank_spike/spike_duplicate__%_recoveries_and_RPD_within_laboratory_control_limits___

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.

* If QC limits are not available, use limits of 70 – 130 %.

Actions:

| QUALITY | %R < LL | %R > UL |
|---|---|---|
| Positive results | J | J |
| Nondetects results | R | Accept |

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).
If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? **Yes** or No.

If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

All criteria were met ___X___
Criteria were not met
and/or see below _____

## IX. LABORATORY DUPLICATE PRECISION

Sample IDs: __JC2480-6/-6_Duplicate____ Matrix:___Air____
Sample IDs: __JC1343-1/-1_Duplicate____ Matrix:___Air____

Laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.
Suggested criteria: RPD ± 25% for air samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

| COMPOUND | SQL | SAMPLE CONC. | DUPLICATE CONC. | RPD | ACTION |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| RPD within method performance criteria for all analytes. | | | | | |
| | | | | | |

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met _____
Criteria were not met
and/or see below ___X___

## IX. FIELD DUPLICATE PRECISION

Sample IDs: __B8SSV1/B8SSV1D_____ Matrix:___Air_____

Field duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.
Suggested criteria: RPD ± 25% for air samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

| COMPOUND | RL | SAMPLE CONC. | DUPLICATE CONC. | RPD | ACTION |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| RPD WITHIN GENERALLY ACCEPTABLE CONTROL LIMITS FOR AIR SAMPLES RESULTS > 5 x MDL | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met __X___
Criteria were not met
and/or see below _____

## X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

* Area of +40% or -40% of the IS area in the associated calibration standard.
* Retention time (RT) within ± 0.06 seconds of the IS area in the associated calibration standard.

| DATE | SAMPLE ID | IS OUT | IS AREA | ACCEPTABLE RANGE | ACTION |
|---|---|---|---|---|---|

_Internal_standard_area_and_retention_times_within_laboratory_control_limits_for_both_samples _and_calibration_standards_excpt for the followings:_____

_____

_09/03/15____JC2870-1A___5-Chlorobenzene-d5__870406___150209_-_350489___No_action_
_09/03/15____JC2870-2____5-Chlorobenzene-d5__588889___150209_-_350489___No_action_

_____

_____

_____

_____

_____

Actions:

1. IS actions should be applied to the compound quantitated with the out-of-control ISs

| QUALITY | IS AREA < -40% | | IS AREA > + 40% |
|---|---|---|---|
| Positive results | J | | J |
| Nondetected results | R | | ACCEPT |

2. If a IS retention time varies more than 0.330 seconds, the chromatographic profile for that sample must be examined to determine if any false positive or negative exists. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for the sample fraction.

All criteria were met __X__
Criteria were not met
and/or see below _____

## XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

Cyclohexane RF = 0.424

[ ] = (259738)(10.0)/(471861)(0.424)

= 12.98 ppbv OK

All criteria were met __X__
Criteria were not met
and/or see below _____

## XII. QUANTITATION LIMITS

### A. Dilution performed

| SAMPLE ID | DILUTION FACTOR | REASONS FOR DILUTION |
|---|---|---|
| Dilution was performed on samples by a factor of less than 3 except the following: | | |
| JC2870-1A | 59.2 | High levels of target species. |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

### B. Percent Solids

List samples which have $\leq$ 50 % solids

Actions:

If the % solids of a soil sample is 10-50%, estimate positive results (J) and nondetects (UJ)

If the % solids of a soil sample is < 10%, estimate positive results (J) and reject nondetects (R)

Project Number:__jc2870_____
Date:_____08/31/2015_____

# REVIEW OF VOLATILE ORGANIC PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: QC criteria from "Compendium Method TO-3: **METHOD FOR THE DETERMINATION OF VOLATILE ORGANIC COMPOUNDS IN AMBIENT AIR USING CRYOGENIC PRECONCENTRATION TECHNIQUES AND GAS CHROMATOGRAPHY WITH FLAME IONIZATION AND ELECTRON CAPTURE DETECTION.** The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) _Accutest_Laboratories_____ data package received has been reviewed and the quality control and performance data summarized. The data review for VOCs included:

Lab. Project/SDG No.: __jc2870_____ Sample matrix: ___Air_____
No. of Samples: _____3_____

Trip blank No.: ____-_____
Field blank No.: _____-_____
Equipment blank No.:___-_____
Field duplicate No.:_____ B8-SSV1/B8-SSV1D_____

___X___ Data Completeness
___X___ Holding Times
___N/A_ GC/MS Tuning
___N/A_ Internal Standard Performance
___X___ Blanks
___X___ Surrogate Recoveries
___N/A_ Matrix Spike/Matrix Spike Duplicate
___X___ Laboratory Control Spikes
___X___ Field Duplicates
___X___ Calibrations
___X___ Compound Identifications
___X___ Compound Quantitation
___X___ Quantitation Limits

Overall Comments:_Methane;_Propane; n-Butane_by_method_TO-3_____
_____

Definition of Qualifiers:
J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer: Rafael Dufant
Date:__ 09/15/2015_____

DATA REVIEW WORKSHEETS

DATA COMPLETENESS

| MISSING INFORMATION | DATE LAB. CONTACTED | DATE RECEIVED |
|---|---|---|

All criteria were met __X__
Criteria were not met
and/or see below _____

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

| SAMPLE ID | DATE SAMPLED | DATE ANALYZED | pH | ACTION |
|---|---|---|---|---|
| | | | | |
| | | | | |
| All samples analyzed within the recommended method holding time | | | | |
| | | | | |
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Criteria

Aqueous samples – 14 days from sample collection for preserved samples (pH $\leq$ 2, 4°C), no air bubbles.
Aqueous samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles.
Soil samples- 7 days from sample collection.
Cooler temperature (Criteria: 4 $\pm$ 2 °C): N/A

Actions

If the VOCs vial(s) have air bubbles, estimate positive results (J) and reject nondetects (R).
If the % solids of soil samples is 10-50%, estimates positive results (J) and nondetects (UJ)
If the % solid of soil samples is < 10%, estimate positive results (J) and reject nondetects (R).
If holding times are exceeded but < 14 days beyond criteria, estimate positive results (J) and nondetects (UJ).
If holding times are exceeded but < 28 days beyond criteria, estimate positive results (J) and reject nondetects (R).
If holding times are grossly exceeded (> 28 days beyond criteria), reject all results (R).
If samples were not iced or if the ice were melted (> 10°C), estimate positive results (J) and nondetects (UJ).

All criteria were met __N/A___
Criteria were not met see below _____

GC/MS TUNING

The assessment of the tuning results is to determine if the sample instrumentation is within the standard tuning QC limits

__N/A_ The BFB performance results were reviewed and found to be within the specified criteria.

__N/A_ BFB tuning was performed for every 24 hours of sample analysis.

If no, use professional judgment to determine whether the associated data should be accepted, qualified or rejected.

List the samples affected:
_____

If mass calibration is in error, all associated data are rejected.

All criteria were met __X__
Criteria were not met
and/or see below _____

## CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____09/01/15_____
Dates of continuing calibration:__09/03/15;_09/04/15___
Instrument ID numbers:____HP_G1530A_____
Matrix/Level:_____Air/low_____

| DATE | LAB FILE ID# | CRITERIA OUT RFs, %RSD, %D, r | COMPOUND | SAMPLES AFFECTED |
|---|---|---|---|---|
| | | | | |
| Initial and continuing calibrations meet method specific requirements. Initial calibration retention times meet method specific requirements. | | | | |
| | | | | |
| | | | | |
| | | | | |
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| | | | | |

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.
All %RSD must be ≤ 15 % regardless of method requirements for CCC.
All %Ds must be ≤ 30% regardless of method requirements for CCC.
Method TO-15 does not specify criterion for the curve correlation coefficient (r). A limit for r of ≥ 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.
If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.
If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 30%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 30%, estimate positive results (J) and nondetects (UJ).
If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has r < 0.995, estimate positive results and nondetects.

A separate worksheet should be filled for each initial curve

All criteria were met __X__
Criteria were not met
and/or see below _____

## V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

| DATE ANALYZED | LAB ID | LEVEL/ MATRIX | COMPOUND | CONCENTRATION UNITS |
|---|---|---|---|---|
| | | | | |
| | | | | |
| All_method_blank_meeth_method_specific_criteria | | | | |
| | | | | |
| | | | | |
| | | | | |

Field/Equipment/Trip blank

| DATE ANALYZED | LAB ID | LEVEL/ MATRIX | COMPOUND | CONCENTRATION UNITS |
|---|---|---|---|---|
| | | | | |
| No_field/trip/equipment_blanks_analyzed_with_this_data_package. | | | | |

All criteria were met __X__
Criteria were not met
and/or see below _____

## V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

ALs = 10x the amount of common contaminants (methylene chloride, acetone, 2-butanone, and toluene)
ALs = 5x for any other compounds

Specific actions are as follows:

If the concentration is < sample quantitation limit (SQL) and ≤ AL, report the compound as not detected (U) at the SQL.
If the concentration is ≥ SQL but ≤ AL, report the compound as not detected (U) at the reported concentration.
If the concentration is ≥ SQL and > AL, report the concentration unqualified.

Notes:

High and low level blanks must be treated separately
Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

| CONTAMINATION SOURCE/LEVEL | COMPOUND | CONC/UNITS | AL/UNITS | SQL | AFFECTED SAMPLES |
|---|---|---|---|---|---|
| | | | | | |
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All criteria were met ____
Criteria were not met
and/or see below ___X___

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.
List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.
Matrix: air/solid/aqueous

| SAMPLE ID | SURROGATE COMPOUND | | | ACTION |
|---|---|---|---|---|
| | 1,2-DICHLOROETHANE-d4 | Toluene-d8 | 4-BFB | |

_BFB_used_as_surrogate_standard;_%_recovery_within_laboratory_limits_except_for_the_____
_followings:_____
_JC2870-1_____137_%_____No_action___
_JC2870-1D_____138_%_____No_action___
_____
_____
_____
_____

**Note:** No action taken professional judgment; % recoveries within control limits in second column.

QC Limits* (Air):_____LL_to:____61_%____UL_to:____137_%_____

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 80 – 120 % for aqueous and 70 – 130 % for solid samples.

Actions:

| QUALITY | %R < 10% | %R = 10% - LL | %R > UL |
|---|---|---|---|
| Positive results | J | J | J |
| Nondetects results | R | UJ | Accept |

Surrogate action should be applied:

If one or more surrogate in the VOC fraction is out of specification, but has a recovery of > 10%.

If any one surrogate in a fraction shows < 10 % recovery.

All criteria were met _____
Criteria were not met
and/or see below __N/A____

## VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.
Sample ID:_____ Matrix/Level:_____

| MS OR MSD | COMPOUND | % R | RPD | QC LIMITS | ACTION |
|---|---|---|---|---|---|
| MS/MSD are not required as part of the method; blank spike used to assess accuracy | | | | | |

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

| QUALITY | %R < LL | %R > UL |
|---|---|---|
| Positive results | J | J |
| Nondetects results | R | Accept |

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).
If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).
If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

All criteria were met ____
Criteria were not met
and/or see below __N/A___

## VII. B MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD – Unspiked Compounds

It should be noted that Method TO-15 does not specify a MS/MSD criteria for the unspiked compounds in the sample. A %RSD of < 50% has therefore been utilized as professional judgment.

If all target analytes were spiked in the MS/MSD, this review element is not applicable.

List the %RSD of the compounds which do not meet the criteria.

Sample ID:_____ Matrix/Level/Unit:_____

| COMPOUND | SAMPLE CONC. | MS CONC. | MSD CONC. | % RSD | ACTION |
|---|---|---|---|---|---|
| | | | | | |

Actions:

* If the % RSD > 50, qualify the positive result in the unspiked samples as estimated (J).
* If the % RSD is not calculated (NC) due to nondetected value, use professional judgment to qualify the data.

All criteria were met __X__
Criteria were not met
and/or see below _____

## VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? Yes or No. If no make note in data review memo.
List the %R of compounds which do not meet the criteria

| LCS ID | COMPOUND | % R | QC LIMIT |
|---|---|---|---|

___LCS_(Blank_spike)_analyzed_in_this_data_package,_recoveries_and_RPD_within_____
___laboratory_control_limits._____
_____
_____
_____
_____
_____
_____
_____
_____

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

| QUALITY | %R < LL | %R > UL |
|---|---|---|
| Positive results | J | J |
| Nondetects results | R | Accept |

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).
If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? Yes or No.
If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

All criteria were met __X___
Criteria were not met
and/or see below _____

## IX. LABORATORY DUPLICATE PRECISION

Sample IDs: _JC2870-1/-1_DUP___ Matrix:___Air____
Sample IDs: _JC3132-1/-1_DUP___ Matrix:___Air____

Field duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.
Suggested criteria: RPD ± 25% for air samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

| COMPOUND | SQL | SAMPLE CONC. | DUPLICATE CONC. | RPD | ACTION |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| RPD within the method performance criteria. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met _X___
Criteria were not met
and/or see below _____

## IX. FIELD DUPLICATE PRECISION

Sample IDs: _JC2870-2/JC2870-3____ Matrix:___Air____

Field duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.
Suggested criteria: RPD ± 50% for air samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

| COMPOUND | SQL | SAMPLE CONC. | DUPLICATE CONC. | RPD | ACTION |
|---|---|---|---|---|---|
| Methane | 0.33/0.51 | 121 | 197 | 48 | Within generally acceptable control limits |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met __N/A___
Criteria were not met
and/or see below _____

## X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

* Area of +40% or -40% of the IS area in the associated calibration standard.
* Retention time (RT) within ± 0.06 seconds of the IS area in the associated calibration standard.

| DATE | SAMPLE ID | IS OUT | IS AREA | ACCEPTABLE RANGE | ACTION |
|---|---|---|---|---|---|

_Internal_standard_not_used_for_calibration;_samples_quantitated_by_the_external_standard___
_method._____

Actions:

1. IS actions should be applied to the compound quantitated with the out-of-control ISs

| QUALITY | IS AREA < -40% | | IS AREA > + 40% |
|---|---|---|---|
| Positive results | J | | J |
| Nondetected results | R | | ACCEPT |

2. If a IS retention time varies more than 0.330 seconds, the chromatographic profile for that sample must be examined to determine if any false positive or negative exists. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for the sample fraction.

All criteria were met __X__
Criteria were not met
and/or see below _____

## XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

JC2870-1

Methane RF = 583900

[ ] = (75908746108)/583900

= $1.3 \times 10^5$ ppmv OK

All criteria were met __X__
Criteria were not met
and/or see below _____

## XII. QUANTITATION LIMITS

### A. Dilution performed

| SAMPLE ID | DILUTION FACTOR | REASONS FOR DILUTION |
|---|---|---|
| Dilution was performed on all samples by a factor of less than 3 fold. | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

### B. Percent Solids

List samples which have $\leq$ 50 % solids

Actions:

If the % solids of a soil sample is 10-50%, estimate positive results (J) and nondetects (UJ)

If the % solids of a soil sample is < 10%, estimate positive results (J) and reject nondetects (R)